

D- Motor Vehicle Analysis



Appendix D

Motor Vehicle Alternatives Analysis

Circulation and Capacity Needs

The motor vehicle capacity and circulation needs in Beaverton were determined for existing and future conditions. The process used for analysis is outlined below, followed by the findings and recommendations of the analysis. The extent and nature of the street improvements for Beaverton are significant. This section outlines the type of street improvements that would be necessary as part of a long-range master plan. Phasing of implementation will be necessary since all of the improvements cannot be done at once. This will require prioritization of projects and periodic updating to reflect current needs. Most importantly, it should be understood that the improvements outlined in the following sections are a guide to managing growth in Beaverton, defining types of right-of-way and street needs that will be required as development occurs over the next 20 years.

Approach

Existing conditions were identified in Chapter 3. The future 2020 conditions were forecast as noted in the Chapter 4. This 2020 forecast includes the Commuter Rail and the highest level of transit service given regional funding constraints¹. It assumes that Transportation Demand Management (TDM) will occur and that significant shifts to transit will occur. While numerous analysis scenarios were developed, the base 2020 conditions assumed a street network that included the RTP Priority System improvements and the improvements identified in the 2015 Beaverton TSP. This was done because the prior TSP and RTP both confirmed that this level of motor vehicle transportation investment would be necessary to minimally address the future 2020 needs of the Beaverton area. RTP Priority System motor vehicle projects within the Beaverton

¹ This system assumes the commuter rail and all the feeder bus system that supports it. Other westside bus service is provided also.

DKS Associates

TSP Study area are shown in Figure D-1 and are listed in Table D-1. Beaverton 2015 TSP improvements are shown in Figures D-2 and D-3 and are listed in Table D-2 to D-3. Table D-4 lists the 2015 TSP projects that have been constructed or have received committed funding for design/construction since the 2015 TSP was adopted. Performance was evaluated using a three-tiered assessment of capacity and operations.

- Demand to capacity (D/C) ratios² were evaluated on roadway segments and conditions where the demand to capacity ratio exceeded 1.0 were studied for potential improvements (based on a 1-hour and 2-hour D/C ratio). Areas within a 2040 design type of Regional Center, Town Center, Main Street, or Station Communities were studied if the 1-hour D/C ratio exceeded 1.1 or the second hour exceeded 1.0.
- Intersection level data were developed for about 95 intersections in Beaverton (based upon staff input, for primarily arterial and collector intersections). While this is a broad sampling of intersections, it does not represent every intersection in the City. Therefore, there may be other locations that may require some mitigation. Alternative improvements were considered where D/C ratios exceeded 1.0 or Level of Service (LOS) was at F or worse. Mitigated levels of service were generally brought to the D/C ratio 1.0 or LOS of E/F range for the 20-year planning assessment.
- New roadway alignments were considered if connectivity was needed to reduce traffic volumes on congested roadways. The goal of new road alignments was to achieve a roadway that would carry a daily volume of at least 5,000 to 10,000 vehicles per day or would significantly reduce the volume on other congested roadway facilities. Additionally, new road connections/alignments were considered if they would reduce neighborhood traffic volumes by 2,000 to 4,000 vehicles per day.

² Demand to capacity ratio is similar to volume to capacity (V/C) ratio. The difference is that in the future demand is being estimated and therefore the term demand is utilized. For existing conditions, volume refers to the actual traffic on the roadway. While a demand to capacity ratio can exceed 1.0, a volume to capacity ratio would never exceed 1.0.

DKS Associates

Table D-1
Beaverton Motor Vehicle System Improvements included in the RTP Priority System*

RTP #	Location	Improvement	Jurisdiction	Time-Line	Cost
1184	BH Highway/Scholls Ferry Road	Redesign the intersection to improve safety for all modes of travel.	ODOT/WAC O	2006-2010	\$13,000,000
6013	Hall: Scholls Ferry to Locust	Widen to 5 lanes. Includes sidewalk and bike lanes	ODOT	2006-2010	\$4,700,000
6017	Taylor's Ferry: Washington to Oleson	Construct a 3 lanes extension with sidewalks and bike lanes	WACO	2011-2020	\$1,900,000
6025	Scholls Ferry: 217 to 125th	Implement system management strategies	WACO	2000-2005	\$500,000
6052	Highway 217 Overcrossing: Nimbus to Mall Area	Construct a 2 lane crossing including sidewalks and bike lanes	Tigard	2011-2020	\$25,000,000
6119	Murray/Scholls Town Center	Construct 2 lane Teal Road collector extension to Town Center Loop and Barrows, transit collectors from Murray to Town Center Loop, and new neighborhood route connections	WACO/Beaverton	2011-2020	\$11,000,000
6121	Murray: Scholls Ferry to Barrows	Construct a 4 lane extension to Walnut at Barrows including sidewalks and bike lanes	Beaverton/Tigard/WACO	2000-2005	\$7,120,000
6122	Davies Road: Scholls Ferry to Barrows	Construct a 3 lane extension to Barrows including sidewalks and bike lanes	Beaverton	2006-2010	\$1,500,000
3000	ORE 217	Add capacity based on recommendations from the ORE 217 corridor study	ODOT	2011-2020	\$70,000,000
3001	ORE 217: TV Hwy to US 26	Widen the northbound to 3 lanes with ramp improvements	ODOT	2006-2010	\$21,000,000
3002	ORE 217 and US 26	Reconfigure the interchange with braided ramps	ODOT	2006-2010	\$50,000,000
3006	US 26: Camelot Court to Sylvan	Add 3 rd through lane and collector distributor system	ODOT	2000-2005	\$22,000,000
3007	US 26: ORE 217 to Camelot Court	Widen eastbound to 3 lanes	ODOT	2006-2010	\$12,000,000
3009	US 26: Murray to 185th	Widen freeway to 6 lanes with possible HOV lane	ODOT	2011-2020	\$26,000,000
3019	Beaverton Connectivity	Complete several downtown street connections	Beaverton	2000-2005	\$13,200,000
3020	Beaverton Connectivity	Complete several downtown street connections	Beaverton	2006-2010	\$13,300,000
3022	Jenkins: Murray to 158th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006-2010	\$1,870,000
3023	ORE 217: Allen to Walker	Interchange improvements	ODOT/WAC O/Beaverton	2000-2005	\$3,600,000
3025	TV Hwy: Cedar Hills to 10th	Add capacity based on recommendation from refinement planning	ODOT/WAC O	2011-2020	\$33,200,000
3031	Allen: ORE 217 to Murray	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2011-2020	\$8,500,000
3032	Cedar Hills: Farmington to Walker	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2006-2010	\$3,700,000
3033	125 th : Brockman to Hall	Construct a 2 lane extension with turn lanes including sidewalks and bike lanes	Beaverton	2000-2005	\$9,800,000
3034	Hall: Cedar Hills to Hocken	Construct a 3 lane extension with sidewalks and bike lanes	Beaverton	2000-2005	\$4,600,000
3036	158 th /Merlo: 170 th to Walker	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011-2020	\$4,000,000
3038	Center: Hall to 113th	Widen to 3 lanes including sidewalks and bike lanes	Beaverton	2011-2020	\$3,200,000
3060	TV Hwy: 117 th to Hillsboro	Implement access management strategies	ODOT/WAC	2006-	\$15,000,000

DKS Associates

			O	2010	
3061	TV Hwy: 209 th to ORE 217	Interconnect Traffic Signals	ODOT/WAC O	2006- 2010	\$1,500,000
3063	Murray: TV Hwy to Allen	Interconnect Traffic Signals	WACO	2000- 2005	\$50,000
3069	Scholls Ferry: Hamilton to Garden Home	Widen to 3 lanes including sidewalks and bike lanes	WACO	2011- 2020	\$8,000,000
3076	Allen: ORE 217 to Western	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2011- 2020	\$1,000,000
3084	170 th : Alexander to Merlo	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011- 2020	\$8,000,000
3085	170 th : Rigert to Blanton to Alexander	Widen to 3 lanes from Rigert to Blanton and 5 lanes from Blanton to Alexander including sidewalks and bike lanes	WACO	2000- 2005	\$26,700,000
3086	158 th : Walker to Jenkins	Widen to 5 lanes including bike lanes	WACO	2011- 2020	\$450,000
3087	Millikan: TV Hwy to 141 st	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2011- 2020	\$4,000,000
3088	Millikan: 141 st to Hocken	Widen to 3 lanes including sidewalks and bike lanes	WACO	2011- 2020	\$3,400,000
3121	TV Hwy: Cedar Hills to Minter Bridge	Refinement Planning to identify phased strategy to implement a limited-access facility	ODOT	2000- 2005	N/A
3141	170 th /173 rd : Baseline to Walker	Widen the street to 3 lanes including sidewalks and bike lanes	WACO	2006- 2010	\$5,500,000
3143	Walker: Cedar Hills to 158th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006- 2010	\$20,000,000
3144	Walker: 158 th to Amberglen	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006- 2010	\$10,000,000
3148	Walker: Cedar Hills to ORE 217	Widen to 3 lanes including sidewalks and bike lanes	WACO	2006- 2010	\$8,000,000
3175	Barnes: ORE 217 to 119th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006- 2010	\$6,200,000
3177	Cedar Hills/Barnes	Reconstruct intersection and approaches to add travel lanes, turn lanes, and traffic signal upgrades	WACO	2000- 2005	\$1,800,000
3181	Cornell: US 26 to 143rd	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011- 2020	\$3,000,000
3183	Cornell: 143 rd to Saltzman	Widen to 3 lanes including sidewalks and bike lanes	WACO	2000- 2005	\$4,600,000
3185	Barnes: Saltzman to 119th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2000- 2005	\$5,300,000
3186	Murray: Science Park to Cornell	Widen to 5 lanes including sidewalks and bike lanes	WACO	2000- 2005	\$3,100,000
3191	Cornell	Modify intersections at Saltzman, Barnes, Murray, and Trail	WACO	2011- 2020	\$500,000
3204	Cornell: Bethany to 179th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006- 2010	\$4,000,000
3205	173rd/174th	Construct a new 2 lane undercrossing of US 26 from Cornell to Bronson including sidewalks and bike lanes	WACO	2011- 2020	\$14,800,000
3214	Farmington: 172 nd to 185th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011- 2020	\$10,000,000
			TOTAL		\$529,590,000

*This project list is based on the August 10th, 2000, *2000 Regional Transportation Plan*, and includes projects in the Financially Constrained and Priority Motor Vehicle System

DKS Associates

Table D-2

Beaverton 2015 TSP Motor Vehicle Improvements not identified in the RTP Priority Scenario

Location	Description	Jurisdiction	Cost
Hocken at TV and Farmington	Widen Hocken to accommodate 2 additional lanes between TV and Farmington to allow turn lanes, Widen TV from 141 st to Hocken to allow 3 through lanes and additional turn lanes	ODOT/Beaverton	\$6,100,000
ORE 217: Walker/Cabot/Canyon Ramps	Braid ramps between Canyon and Walker/Cabot split diamond	ODOT	\$20,800,000
Bany/Hart: 170 th to 160th	Improve to 2-3 lanes including sidewalks and bike lanes	WACO	\$1,000,000
170 th : Merlo to Baseline	Widen to 3 lanes including sidewalks and bike lanes	WACO	\$2,100,000
170 th : Division to Blanton	Widen to 5 lanes including sidewalks and bike lanes	WACO	\$2,500,000
Hyland Extension: Carr to Hart	Extend Roadway	Beaverton	\$115,000
ORE 217: Denney/Allen	Collector/Distributor connection	ODOT	\$8,600,000
Cedar Hills: Walker to US 26	Complete 5 lane roadway with access control including sidewalks and bike lanes	WACO	\$2,100,000
143 rd /Meadow: Science Park - Walker	Construct a new 2 lane road connections including a grade separation of US 26 including sidewalks and bike lanes	WACO	\$16,000,000
Walker Road: Murray to ORE 217	Widen to 5 lanes including sidewalks and bike lanes	WACO	\$26,500,000
Jenkins: Murray to Cedar Hills	Widen to 5 lanes including sidewalks and bike lanes	WACO	\$3,800,000
Scholls Ferry: Hall to 125th	Widen to 7 lanes including sidewalks and bike lanes	WACO/ODOT	\$15,760,000
Scholls Ferry: Teal to 175th	Widen to 5 lanes including sidewalks and bike lanes	WACO	\$4,000,000
Beard/Nora: Murray to 170th	Improve to 2-3 lanes including sidewalks and bike lanes	WACO	\$6,600,000
Weir: Murray to 175th	Improve to 3 lanes including sidewalks and bike lanes	Beaverton	\$3,700,000
Hall north of Center	Extend new 5 lane roadway north of Center to connect with Jenkins at Cedar Hills including sidewalks and bike lanes	Beaverton	\$11,000,000
Center: Cedar Hills to Hocken via Westgate	Extend public roadway with 3 lanes including sidewalks and bike lanes from Center to Westgate and from Westgate to Hocken	Beaverton	\$1,500,000
141 st : Tek to Farmington	Realign and extend 2/3 lane roadway including sidewalks and bike lanes	Beaverton	\$2,800,000
Nimbus: Hall to Denney	Extend 2/3 lane roadway including sidewalks and bike lanes	Beaverton	\$8,300,000
Local Streets	Add local and collector connectivity	Beaverton	\$41,900,000
Traffic Signals	Addition of 50 traffic signals per plan	Beaverton/ WACO/ODOT	\$12,500,000
Intersection Improvements	Listed in Table D-3	Beaverton/ WACO/ODOT	\$60,325,000
		TOTAL	\$258,000,000

DKS Associates

Table D-3
2015 TSP Intersection Improvements

#	Location	Improvement	Cost
1	Kinnaman/Farmington	Widen Farmington to 5 lanes; add WB left turn lane; add NB/SB left turn lane; signal phasing modifications to NB/SB permitted/protected phasing	\$1,250,000
2	Walker/173 rd	Widen Walker Road to 5 lanes; add EB/WB right turn lanes; NB/SB double left turn lanes	\$2,000,000
3	Baseline/170 th	SB double left turn lanes; signal phasing modification of NB/SB to protected phasing; add WB right turn lane	\$1,250,000
4	Merlo/170 th	Signal phase change to permitted/protected for NB/SB approaches and to protected phasing for EB/WB approaches; add NB right turn lane; add NB, SB, and EB left turn lanes	\$1,500,000
5	TV Highway/170 th	Widen TV Highway to 7 lanes (3 through lanes each way); widen 170 th to 5 lanes; add SB right turn lane; WB double left turn lanes	\$1,000,000
6	Farmington/170 th	Widen Farmington to 5 lanes; add NB left turn lane; add NB through lane and restripe SB for additional through lane (widen 170 th to 5 lanes)	Cost included in roadway project
7	Hart-Bany/170 th	Install traffic signal; add NB and SB left turn lanes	\$1,250,000
8	Walker/167 th	Install traffic signal; add NB and SB left turn lanes	\$250,000
9	Cornell/158 th	Add EB right turn lane	\$500,000
10	Walker/158 th	NB/SB double left turn lanes; add EB right turn lane; NB right turn lane; WB through lane (2 through lanes in each direction); signal phasing change to EB/WB permitted/protected phasing	\$2,250,000
11	Jenkins/158 th	Add NB right turn lane; add SB through lane and restripe SB approach; WB double left turn lanes; WB through lane (5 lanes on Jenkins)	\$1,000,000
12	TV Highway/Millikan	Widen TV to 7 lanes; add SB and NB lane across intersection	\$1,625,000
13	Hart/155 th	Add WB left turn lane	\$500,000
14	Jenkins/153 rd	Widen Jenkins to 5 lanes (2 through lanes each way)	Cost included in roadway project
15	TV Highway/153 rd	Widen TV Highway to 7 lanes (3 through lanes each way)	Cost included in roadway project
16	Farmington/149 th	Widen Farmington to 5 lanes	Cost included in roadway project
17	Walker/Murray	Add double left turn lanes on all approaches; add right turn lanes on all approaches	\$4,000,000
18	Murray/Jenkins	Add NB and SB right turn lanes; NB and SB double left turn lanes; widen Jenkins to 5 lanes	\$2,000,000
19	TV Highway/Murray	Double left turn lanes on all approaches; add NB/SB through lane (3 through lanes each way) DCP; install median at TV/Railroad tracks/Farmington to restrict driveways to right in, right out	\$1,500,000
20	Murray/Farmington	Double left turn lanes on all approaches; SB, EB, and WB right turn lanes	\$2,500,000
21	Murray/6 th	Install traffic signal; add EB and WB left turn lanes	\$250,000
22	Murray/Allen	Widen Allen to 5 lanes to Murray (drop additional WB through lane after Murray); add SB right turn lane	\$600,000
23	Murray/Hart	Signal phase change to permitted/protected phasing for all approaches	\$125,000
24	Murray/Scholls Ferry	Restripe NB, SB, and EB approaches; signal phase change to protected phasing on all approaches	\$125,000
25	Murray/Barrows/Walnut	Install traffic signal; add EB left turn lane; restripe NB approach; construct SB approach left turn lane	\$750,000
26	Scholls Ferry/Barrows (west)	Install traffic signal; restripe SB approach for separate left turn and right turn lanes	\$250,000
27	Scholls Ferry/Davies	Install traffic signal; restripe WB approach; add NB right turn lane; add NB left turn lane	\$250,000
28	Scholls Ferry/Barrows (east)	Close Barrows at Scholls Ferry	\$150,000
29	TV Highway/Hocken	Add EB right turn lane; restripe SB approach; widen Hocken to 2 SB through lanes	\$3,100,000
30	Farmington/Hocken	Add WB right turn lanes; SB double left turn lanes (Hocken carries 2 SB lanes from TV Highway)	\$3,000,000

DKS Associates

31	Cedar Hills/Walker	Double left turn lanes on all approaches; add EB right turn lane	\$2,500,000
32	Cedar Hills/Jenkins	SB and EB double left turn lanes; add SB right turn lane; widen Jenkins to 5 lanes; WB right turn channel; signal modifications to EB/WB protected phasing	\$1,750,000
33	Cedar Hills/Hall	Add NB right turn lane	\$500,000
34	Cedar Hills/Westgate	Add NB left turn lane	\$1,300,000
35	Canyon/Cedar Hills	Widen Canyon to 7 lanes on west leg; add NB left turn lane; add SB left turn lane; add SB right turn lane; add EB/WB left turn lane	\$5,000,000
36	Farmington/Cedar Hills	SB double left turn lanes (construct SB right turn lane and restripe SB lanes as side-by-side left turn lanes)	\$1,000,000
37	Hall/Westgate-Center	Realign intersection; signal modification to EB/WB protected/permitted phasing	\$250,000
38	Canyon/Watson	Restripe SB approach (add a SB receiving lane)	\$700,000
39	Farmington/Watson	Add SB through lane	\$500,000
40	Farmington/Hall	Restripe NB approach (add NB receiving lane)	\$500,000
41	Hall/Allen	Add EB and WB right turn lanes; NB and SB double left turn lanes	\$1,700,000
42	Hall/Denney	NB/SB signal phasing change to permitted/protected	\$150,000
43	Hall/Greenway	Signal phase change to permitted/protected phasing for EB and WB approaches, overlap NB right turn	\$125,000
44	Hall/Nimbus	Signal phase change to protected/permitted phasing for NB and SB approaches	\$125,000
45	Scholls Ferry/Hall	Add double left turn lanes on all approaches; add right turn lane on all approaches	\$3,000,000
46	Brockman/125 th	Signal phase change to protected/permitted phasing for all approaches; add WB left turn lane; restripe NB and EB approaches; construct SB left turn lane, right turn lane, and through lane	Cost included in roadway project
47	Scholls Ferry/125 th	Widen Scholls Ferry Road to 7 lanes (3 through lanes each way); add SB right turn lane	\$500,000
48	Scholls Ferry/Nimbus	Widen Scholls Ferry to 7 lanes (3 through lanes in each direction); add NB left turn lane; SB double left turn lanes	\$1,000,000
49	Scholls Ferry/ORE 217 SB ramps	Channel EB right turn onto ramp and modify signal to allow free movement of EB right turns	\$500,000
50	Scholls Ferry/ORE 217 NB on-ramp	Channel SB right turn onto ramp and modify signal to allow free movement of SB right turns; add WB through lane onto ramp	\$500,000
51	Farmington/Lombard	Add NB right turn lane	\$500,000
52	Canyon/Broadway	Add WB right turn lane; signal modification to NB/SB protected phasing	\$200,000
53	Canyon/Fred Meyer	Add SB left turn lane; signal modification to NB/SB split phasing	\$125,000
54	BH Highway/Griffith	Signal phasing modification to NB/SB protected/permitted phasing	\$150,000
55	BH Highway/Western	Add EB right turn lane; add WB double left turn lanes; add NB through lane	\$1,500,000
56	Allen/Western	Add EB left turn lane; EB/WB signal phasing change to permitted/protected phasing	\$125,000
57	Allen/Scholls Ferry	Widen Allen to 5 lanes; restripe WB approach; signal phase change for all approaches to permitted/protected phasing	\$125,000
58	Walker/ORE 217 SB	Bridge deck widening; EB double right turn lanes (add right turn lane); WB through lane	\$750,000
59	Walker/ORE 217 NB	Add NB double left turn lanes	\$250,000
60	Canyon/ORE 217 SB	Add SB left turn lane and restripe SB lanes	\$500,000
61	BH Highway/ORE 217 SB	Add SB left turn lane	\$500,000
62	BH Highway/ORE 217 NB	NB double left turn lanes	\$600,000
63	Allen/ORE 217 SB	Add SB right turn lane (double right lanes); EB right turn lane (channel onto ramp; signal modification to allow EB right turn to go with SB left)	\$2,000,000
64	Allen/ORE 217 NB	Add WB right turn lane; signal modifications to NB/SB split phasing	\$500,000
65	Denney/ORE 217 SB	Install traffic signal	\$250,000
66	Denney/ORE 217 NB	Install traffic signal	\$250,000
67	Denney/Lombard	Install traffic signal and EB and WB left turn lanes	\$1,125,000
			\$64,025,000

DKS Associates

Table D-4
Committed/Completed Beaverton 2015 TSP Motor Vehicle Improvements

Location	Description	Jurisdiction	Cost
Farmington: Murray to 172nd	Widen to 5 lanes including sidewalks and bike lanes	WACO	\$15,200,000
Oak: 160 th to 170 th	Widen roadway including sidewalks and bike lanes	WACO	\$1,600,000
US 26: ORE 217 to Murray	Widen to 6 lanes and add braided ramps	ODOT	\$13,000,000
Jenkins: Cedar Hills to Murray	Widen to 3 lanes including sidewalks and bike lanes	WACO	\$3,100,000
170 th : Rigert to Alexander	Widen to 5 lanes including sidewalks and bike lanes	WACO	\$8,000,000
Millikan: Hocken to Cedar Hills	Construct new 3 lane extension with sidewalks and bike lanes	Beaverton	\$4,300,000
Hart: Murray to 165 th	Widen to 3 lanes including sidewalks and bike lanes	Beaverton	\$7,100,000
Lombard: Broadway to Farmington	Realign and add turn lanes including sidewalks	Beaverton	\$1,600,000
Hall Boulevard at Scholls Ferry	Provide southbound right turn lane	ODOT	\$250,000
Hall: 12 th St to 500 feet south of Allen	Retrofit to include bike lanes; intersection turn lanes at Allen	Beaverton	\$1,438,000
Farmington: Murray to Hocken	Widen to 5 lanes including turn lanes, sidewalks, and bike lanes	Beaverton	\$9,300,000
		TOTAL	\$64,888,000

City of Beaverton Transportation System Plan



LEGEND

- 3000 - Priority System Project Number
- 3000 - Financially Constrained System Project Number
- - Motor Vehicle Project Location
- - Proposed Future Street
- 2000 TSP Update Study Area Boundary Line
- Projects With Committed Funds

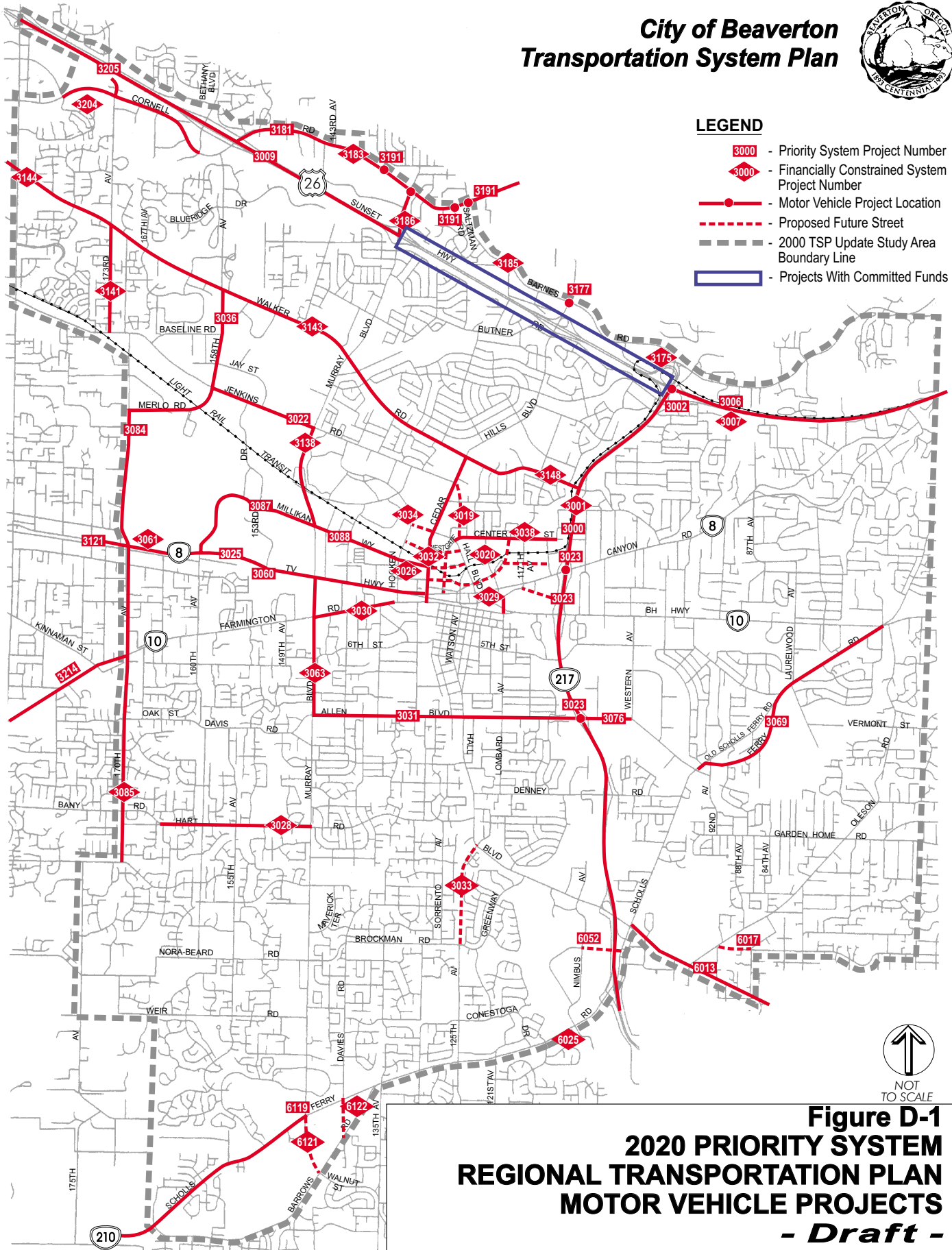


Figure D-1
2020 PRIORITY SYSTEM
REGIONAL TRANSPORTATION PLAN
MOTOR VEHICLE PROJECTS
- Draft -

TSP Figure D - 2

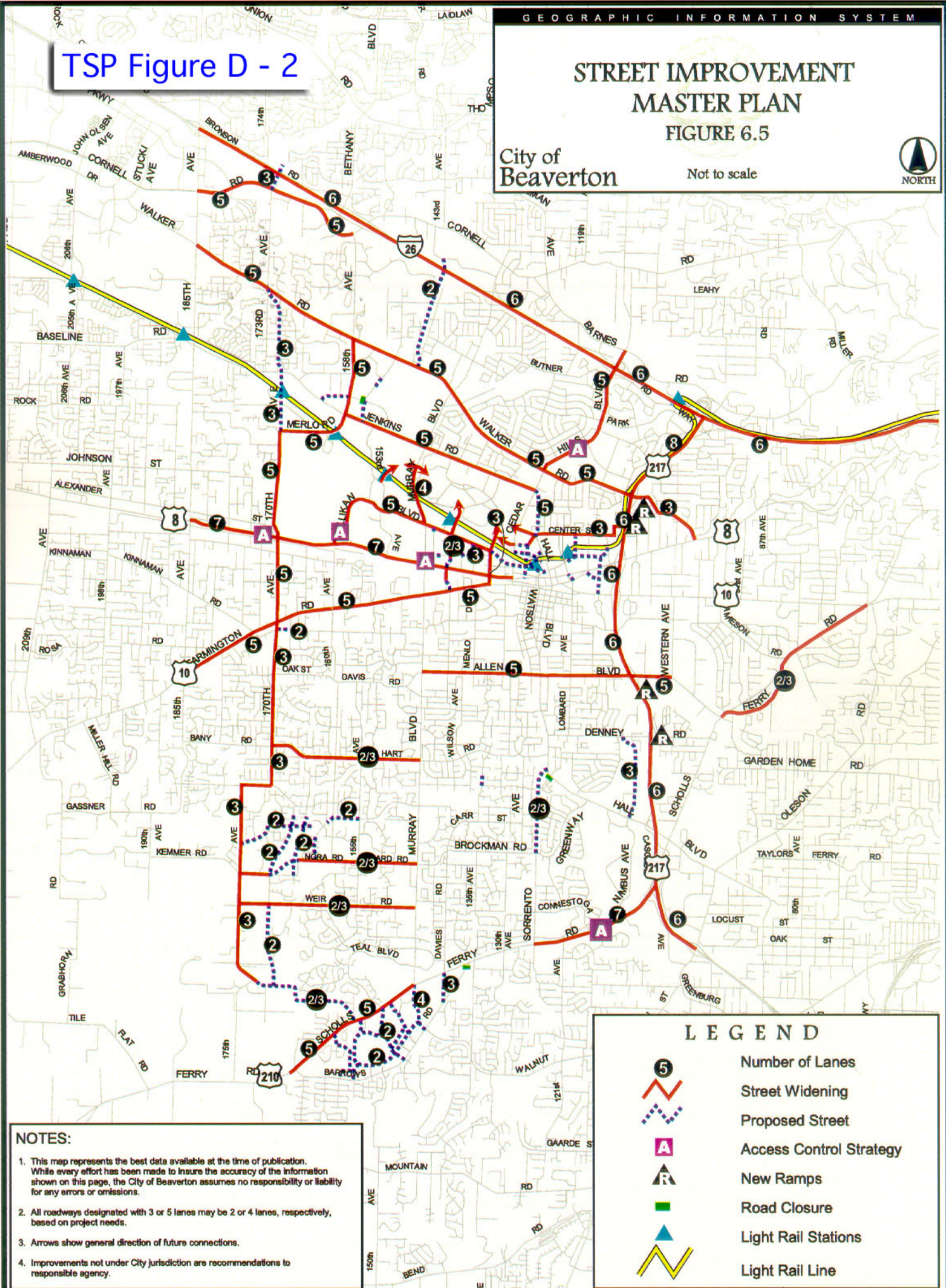
GEOGRAPHIC INFORMATION SYSTEM

STREET IMPROVEMENT MASTER PLAN

FIGURE 6.5

City of
Beaverton

Not to scale



NOTES:

1. This map represents the best data available at the time of publication. While every effort has been made to insure the accuracy of the information shown on this page, the City of Beaverton assumes no responsibility or liability for any errors or omissions.
2. All roadways designated with 3 or 5 lanes may be 2 or 4 lanes, respectively, based on project needs.
3. Arrows show general direction of future connections.
4. Improvements not under City jurisdiction are recommendations to responsible agency.

LEGEND

- Number of Lanes
- Street Widening
- Proposed Street
- Access Control Strategy
- New Ramps
- Road Closure
- Light Rail Stations
- Light Rail Line

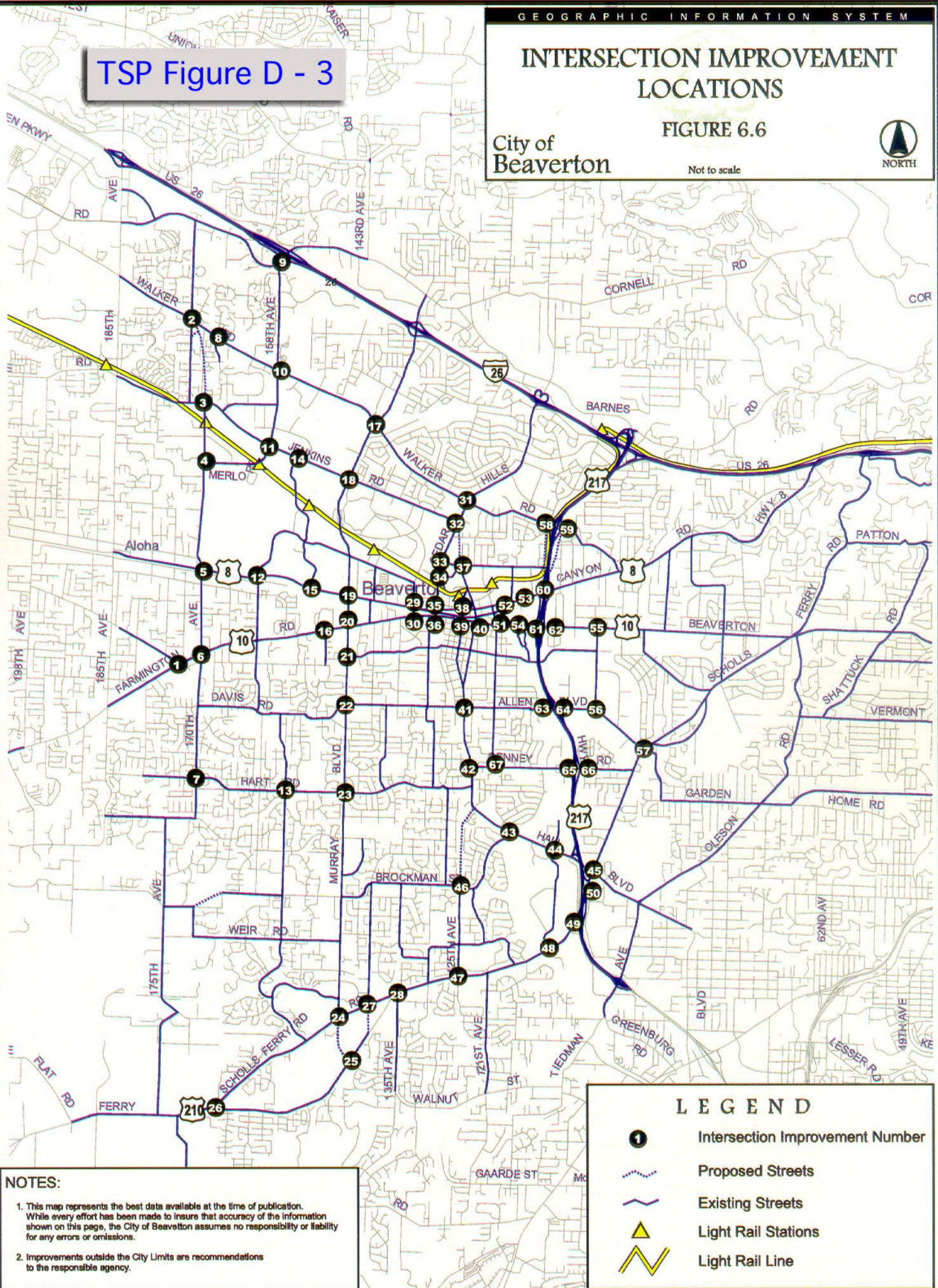
TSP Figure D - 3

INTERSECTION IMPROVEMENT
LOCATIONS

FIGURE 6.6

City of
Beaverton

Not to scale



DKS Associates

Assessment of Need

Based upon the evaluation of intersection level of service, 32 of the study intersections would operate at or worse than D/C ratio 1.0 or Level of Service (LOS) E in the 2020 evening peak hour with no improvements beyond the RTP Priority System or 2015 Beaverton TSP improvements. Intersection operation for the existing and base 2020 scenarios are shown in Table D-5. The impact of future growth would be severe without significant investment in transportation improvements. Corridors would become unmanageably congested, resulting in travel speeds below 5 MPH over long stretches of road. Poor performance on arterials and collectors would result in substantial impacts (added through traffic) to other collectors and neighborhood routes. The greatest problem areas can be grouped into the following areas:

- **Lack of east-west capacity.** Three of the key east-west routes (TV Highway, Walker, Cornell and Farmington) all experience significant congestion problems if improvements are not made.
- **Lack of connectivity.** Areas near ORE 217 between Walker and Hall are the best examples, where all north-south movements must use local streets or divert to neighboring arterials.
- **Lack of intersection turning capacity.** Many intersections experience congested conditions, not the need for through capacity, but the need for additional right or left turning capacity.

Figure D-4 shows the major alternatives that were modeled and analyzed for the 2020 TSP Update. These alternatives are improvements that were not assumed in the base 2020 network (which includes the RTP Priority Scenario improvements).

Table D-5
Existing and 2020 Base Intersection Operation (PM Peak Hour)

Study Intersections Along Scholls Ferry Road

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/Capacity	Level of Service	Average Delay	Demand/Capacity
Murray/Scholls Ferry	C	32.0	0.70	D	54.2	0.97
Scholls Ferry/121 st	D	40.4	0.96	D	37.3	0.93
Scholls Ferry/125 th	D	41.6	0.92	E	63.3	1.05
Scholls Ferry/135 th	B	18.4	0.70	B	13.4	0.66
Scholls Ferry/Allen	E	64.5	0.98	D	50.2	0.95
Scholls Ferry/Barrows	B	17.3	0.69	Road Closure		
Scholls Ferry/Cascade	C	23.8	0.76	C	32.9	0.93
Scholls Ferry/Conestoga	B	10.3	0.72	B	12.7	0.78
Scholls Ferry/Davies	C/F			B	18.2	0.70
Scholls Ferry/Denney	C	24.6	0.75	C	24.7	0.77

DKS Associates

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand/ Capacity
Scholls Ferry/Hall	E	65.9	0.99	D	40.9	0.75
Scholls Ferry/Nimbus	D	53.6	0.99	E	65.4	1.07
Scholls Ferry/Laurelwood	B/F			B/F		
Scholls Ferry/ORE 217 northbound off ramp	C	22.2	0.71	B	19.6	0.64
Scholls Ferry/ORE 217 northbound on ramp	C	30.3	0.78	F	>100.0	1.43
Scholls Ferry/ORE 217 southbound ramp	C	31.6	0.76	C	32.3	0.74

Study Intersections Along TV Highway/Canyon Road

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
170 th /TV Hwy	E	63.1	1.00	F	89.3	1.15
160 th /TV Hwy	D	49.6	0.97	E	73.8	1.14
Canyon/117 th	C	22.9	0.66	C	25.9	0.76
Canyon/87 th	B	18.7	0.68	C	25.0	0.85
Canyon/Cedar Hills	C	34.1	0.85	D	37.9	0.95
Canyon/Hall	C	22.9	0.80	C	25.3	0.84
Canyon/Watson	B	16.8	0.68	C	22.7	0.84
Canyon/Lombard	C	21.2	0.66	D	44.7	0.95
Canyon/Hocken	D	38.3	0.90	D	49.5	1.03
Canyon/ORE 217 northbound ramp	C	24.9	0.66	C	28.5	0.81
Canyon/ORE 217 southbound ramp	C	24.3	0.67	C	28.4	0.84
TV Hwy/Murray	E	65.1	1.00	F	>100.0	1.10

Study Intersections Along Farmington Road/Beaverton-Hillsdale Highway

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
170 th /Farmington	C	26.1	0.60	F	88.3	1.14
BH Hwy/Griffith	C	31.0	0.81	C	30.8	0.76
BH Hwy/Laurelwood	C	26.2	0.80	E	66.7	1.09
BH Hwy/Western	C	33.7	0.87	C	29.4	0.72
Farmington/Cedar Hills	C	27.2	0.90	D	53.2	1.08
Farmington/Hall	C	25.4	0.85	C	28.7	0.90
Farmington/Hocken	C	22.6	0.84	C	22.4	0.74

DKS Associates

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
Farmington/Lombard	C	30.7	0.78	D	51.6	0.97
Farmington/ORE 217 northbound ramp	C	34.9	0.94	C	28.4	0.80
Farmington/ORE 217 southbound ramp	C	25.6	0.73	C	33.5	0.89
Farmington/Watson	C	24.2	0.77	C	23.4	0.85
Murray/Farmington	F	89.4	1.00	F	>100.0	1.16

Remaining Study Intersections

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
158 th /Blueridge	C	26.3	0.71	D	40.7	0.99
158 th /Cornell	C	27.1	0.78	D	39.2	0.97
158 th /Jay	C	26.4	0.60	C	32.9	0.92
158 th /Jenkins	D	38.2	0.86	E	78.6	1.10
158 th /Walker	E	61.3	1.00	E	58.9	1.01
170 th /Baseline	C	21.2	0.58	D	43.5	0.95
170 th /Oak	A/F			B	12.6	0.75
170 th /Merlo	C	22.4	0.63	C	27.8	0.72
170 th /Hart/Bany	C/F/C/F			C	33.6	0.71
173 rd /Walker	E	63.4	0.98	D	36.0	0.86
Allen/ORE 217 northbound ramp	C	25.5	0.81	C	32.4	0.90
Allen/ORE 217 southbound ramp	C	34.2	0.88	C	35.0	0.90
Allen/Western	C	28.7	0.73	D	37.2	0.92
Cedar Hills/Barnes	E	68.8	1.00	F	>100.0	1.22
Cedar Hills/Butner	C	34.7	0.83	D	40.2	0.95
Cedar Hills/Hall	C	30.9	0.74	D	35.5	0.90
Cedar Hills/Jenkins	D	40.0	0.88	D	41.8	0.92
Cedar Hills/US 26 eastbound ramps	C/F			C	29.5	0.90
Cedar Hills/US 26 westbound ramps	B	12.8	0.63	C	29.9	0.97
Cedar Hills/Walker	E	58.2	1.00	F	>100.0	1.34
Cornell/143rd	C	25.5	0.80	E	55.3	0.90
Cornell/173 rd	D	43.5	0.93	F	>100.0	1.24
Cornell/Barnes/Saltzman	E	57.3	0.94	F	>100.0	1.42
Cornell/Bethany	C	30.4	0.76	E	54.3	1.02
Denney/ORE 217	B/F			D	37.0	0.85

DKS Associates

Intersection	Existing (2000)			Forecasted Priority Base (2020)		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
northbound ramp						
Denney/ORE 217	A/F			D	42.7	0.96
southbound ramp						
Garden Home/84 th	A/D			A/D		
Garden Home/88 th	A/C			A/C		
Greenway/125 th	B	17.5	0.52	D	36.5	0.77
Hall/Allen	D	44.4	0.91	D	48.6	0.97
Hall/Cascade/ORE 217	D	51.3	0.96	E	76.0	1.11
southbound ramp						
Hall/Center	C	23.8	0.48	C	25.7	0.68
Hall/Denney	C	32.4	0.85	E	57.9	1.02
Hall/Greenway	E	61.9	1.00	D	49.9	1.01
Hall/Nimbus	C	34.3	0.84	D	43.9	0.95
Hart/155 th	B	18.2	0.77	B	15.8	0.52
Murray/6 th	C/F			C	34.2	0.98
Murray/Allen	D	51.0	0.95	F	>100.0	1.27
Murray/Brockman/Beard	C	31.4	0.74	F	98.7	1.19
Murray/Cornell	E	62.3	0.98	F	>100.0	1.39
Murray/Hart	D	37.2	0.86	D	52.6	1.01
Murray/Jenkins	D	44.5	0.89	E	75.4	1.15
Murray/US 26	B	15.2	0.55	B	14.6	0.68
eastbound ramps						
Murray/US 26	C	28.1	0.79	E	65.1	1.10
westbound ramps						
Murray/Walker	D	54.2	0.98	E	60.9	1.06
Oleson/Garden Home	D	42.8	0.95	D	49.7	1.00
Oleson/Vermont	C	25.1	0.76	C	25.4	0.78
US 26 eastbound	C	22.2	0.66	D	53.8	1.01
ramp/Bethany						
US 26 eastbound	B	17.1	0.66	C	23.5	0.86
ramp/Cornell						
US 26 westbound	D	44.1	0.95	F	85.9	1.19
ramp/Bethany						
US 26 westbound	C	28.4	0.78	D	53.2	1.01
ramp/Cornell						
Walker/ORE 217	C	21.1	0.68	C	24.1	0.76
northbound ramp						
Walker/ORE 217	B	19.4	0.84	B	15.9	0.64
southbound ramp						

City of Beaverton Transportation System Plan



LEGEND

--- - Study Area Boundary

A₁ - Murray Overcrossing

A₂ - TV Hwy. 7-Lanes

B₁ - 143rd Extension

B₂ - Cornell 5-Lanes

B₃ - 143rd Overcrossing

C₁ - Western-Walker Extension

C₂ - Denney-Allen

C₃ - Nimbus Extension

D₁ - Jenkins Extension

D₂ - Hall Extension

D₃ - Downtown Connectivity

D₄ - Fairfield-Terman

E - Bethany from Bronson to US-26

F₁ - Scholls Ferry Overcrossing Cascade

F₂ - Scholls Ferry 7-Lanes

H - 170th/173rd Couplet

J - Walker 5-Lanes

K - 217 Frontage Rd.

L₁ - Murray Extension

L₂ - Davies Extension

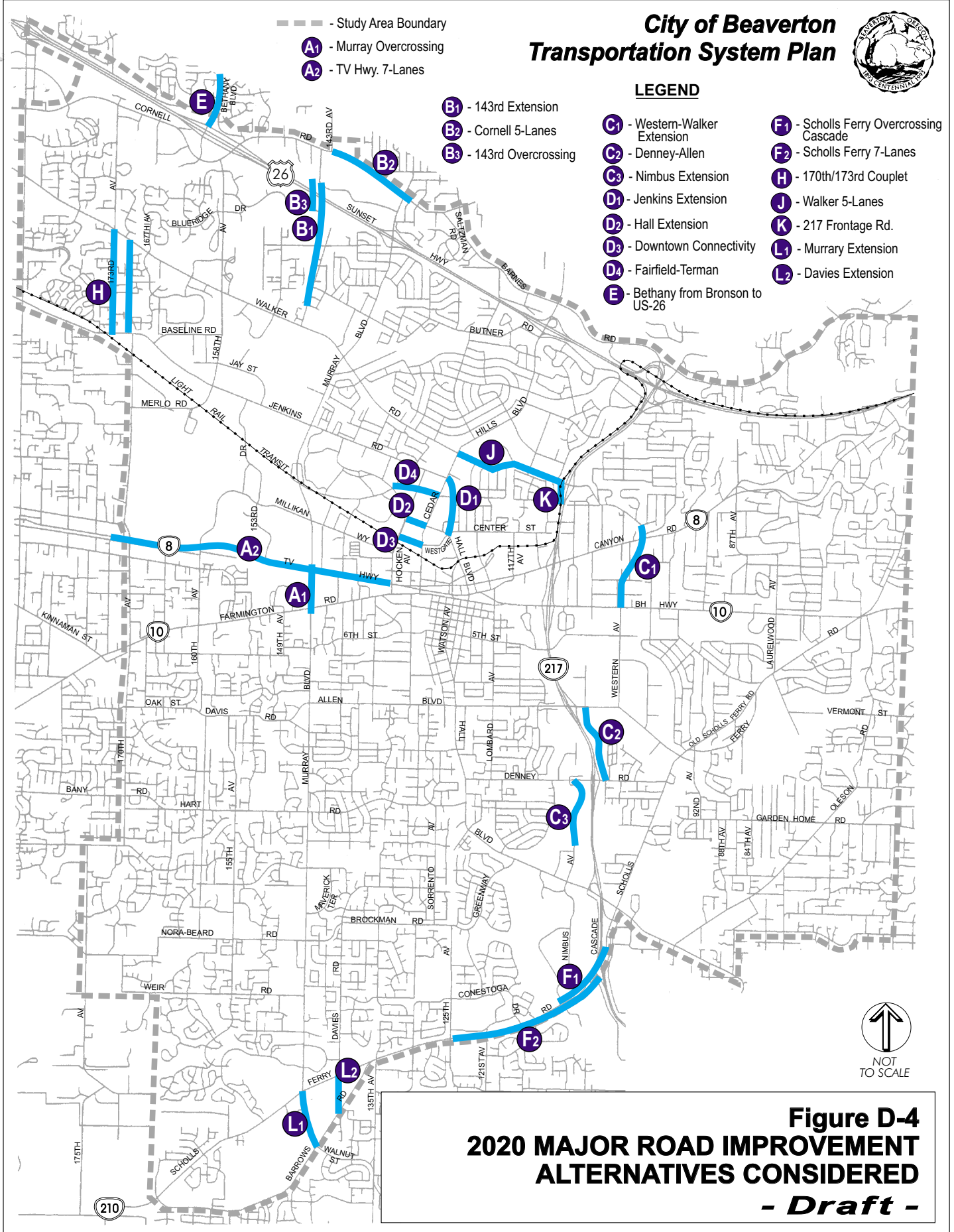


Figure D-4
2020 MAJOR ROAD IMPROVEMENT
ALTERNATIVES CONSIDERED
- Draft -

DKS Associates

Recommended Improvement Plan

To address these deficiencies, a series of alternatives and strategies were considered. The range of strategies includes:

- **Do nothing.** This would result in severe impacts to circulation in Beaverton with delays that would not be tolerable. Extreme land use controls would be required to protect livability.
- **Assume that alternative modes can serve excess demand.** The TSP analysis assumed that these would be developed to their optimal levels to achieve mode-split targets. The order of magnitude of trips to be served by 2020 goes well beyond the capacity of the alternative mode system by themselves, even at their optimal levels. The estimated growth in PM peak period trips far exceeded the capacity of the alternative modes by themselves to support this demand.
- **Build all the road capacity necessary to achieve level of service D conditions at the intersections.** This strategy would result in nearly doubling the cost of the improvements identified in this plan. For example, many five lane cross sections would need to become seven lanes, substantial freeway widening beyond those currently foreseen and very large intersection configurations.
- **Pragmatically add capacity to all modes, developing a balanced system. Outline the long-term configuration of streets to allow development to best accommodate needs. Allow LOS E or D/C ratios of 1.0 at intersections and maintain system performance measures at a 2-hour D/C ratio of 1.0.** This is the strategy that was pursued. It involves significant system improvements, but attempts to balance performance between modes by not only adding additional capacity, but by also providing additional connectivity to serve multi-modal trips.

The mitigation measures for the street system are outlined in a graphic and a table. Figure D-5 outlines the street and intersection improvements, which are summarized in Table D-6. Figure D-6 shows the future streets where right of way is planned for more than two lanes. Each of the following problem areas noted previously have been addressed in the following manner:

East-West Capacity. Capacity improvements were considered in the following areas:

- **Cornell (B1-B3).** Capacity problems were identified from Saltzman to 143rd and further to the west at US 26. The majority of the problems are the result of a lack of route choices from the north of Cornell to the south of US 26 for both east-west and north-south circulation. Several improvement scenarios were tested that included variations and combinations of widening Cornell to 5 lanes, creating a new US 26 crossing from Science Park to Cornell Oaks or Walker, and widening Walker to 7 lanes. The new US 26 overcrossing was found to attract significant volume from Murray/Cornell as well as 158th/Cornell (in addition to providing additional multi-model connectivity), but it did not completely mitigate the capacity problems on Cornell from Murray to 143rd by itself. Possible combinations of alignments that would extend from Trail to Science Park, over US 26 to Greenbrier and the

DKS Associates

powerlines right-of-way south to Walker were tested. The maximum benefit accrued when the alignment of this new roadway extended south to Walker (approximately 12,000 vehicles per day (vpd)). Connections that did not continue south of Greenbrier had substantially lower benefits to the surrounding street system (only attracting about 4,000 vpd). There were no feasible alignments for overcrossings of US 26 to the east of Murray that could be identified without extensive wetland, neighborhood and property impacts. Extending the 5-lane cross section on Cornell to the east of Murray (to Dale Avenue) addressed the capacity deficiency on Cornell from Murray - without the 143rd-Walker US 26 overcrossing. This project improvement is also identified in the RTP Preferred Scenario. Unfortunately, there would be no remaining capacity in this sub-area should further urban growth boundary expansions be considered than those identified in the 2020 Metro land use forecast. Further to the east, the Cedar Mill Town Center Plan identified Cornell as a 3-lane section from Murray to Saltzman Road. Forecasted volumes in the section exceed thresholds for link volumes and intersection capacity at Cornell/Saltzman. Other parallel routes and connections were considered in the Cedar Mill Town Center Plan, but none were approved or adopted. Walker was tested as a 7-lane facility from ORE 217 to 158th, but it did not attract significant volume from Cornell (less than 500 vpd). Therefore, Cornell will be identified in this TSP as needing five lanes to just east of Murray (Dale Avenue). Further study and refinement in this sub-area will be required in the next twenty years to address deficiencies at the Barnes-Saltzman/Cornell intersection and the need for additional east/west and north/south capacity beyond 2020 (including refining the limits of the 5-lane section of Cornell), which may include the need for the 143rd overcrossing corridor (from Trail to Walker). Based on input from the Traffic Commission, the 143rd extension from Cornell to Walker (including the US 26 overcrossing) should be identified for ROW reservation to ensure that as development occurs, the possibility remains that a multi-modal project could be considered in the future³. The Traffic Commission agreed that this area would need additional capacity and connectivity in the future.

- **TV Highway (A2).** TV Highway was identified in the RTP for capacity improvements. An expressway facility was identified in the RTP west of Hocken to Hillsboro. The prior TSP has recommended a 7-lane cross section and an access managed high-volume facility, consistent with the Washington County Transportation Plan from 1988. Both options would satisfy the need for east-west capacity. Further corridor study refinement should be conducted to determine the ultimate design (this study should outline some initial basic options, alignment and right-of-way issues as well as the access and frontage road needs). For this TSP, a placeholder project of seven lanes was assumed (consistent with prior adopted

³ City of Beaverton Traffic Commission Meeting, May 17, 2001.

plans), which would be superseded by any future corridor study findings.

- **Walker Road (J1).** Walker Road between Cedar Hills and ORE 217 is identified for improvement to a 3-lane section in the RTP (5-lanes in the RTP Preferred Scenario). Forecasted volumes indicate that a 3-lane section would not be adequate to carry future 2020 traffic volumes. The two-hour peak period performance as well as the key intersection capacity would both be exceeded. Alternative modeled scenarios included downtown capacity improvements, ORE 217 frontage road improvements, and Cornell Road improvements in addition to five lanes on Walker Road. None of the alternatives would relieve the need for 5 lanes from ORE 217 to Cedar Hills Boulevard. Therefore, for this TSP a five lane Walker Road from ORE 217 west to Hillsboro is included in the plan (similar to the prior TSP and consistent with the RTP Preferred Scenario).

- **Downtown (D1-D4).** Improvements to east-west capacity in the downtown area were examined to attempt relief to the congested major routes serving Beaverton (TV Highway, Murray, Farmington, Jenkins, and Walker). The downtown connectivity improvements were included in the base improvement scenario (from the RTP Priority system and prior TSP) including the extension of Millikan eastward through the downtown via Henry Street, Rose Biggi and 120th. Each of these connections improve circulation in the downtown area for the future scenario. The existing Short Avenue was assumed to be replaced (closed) with the future opening of Rose Biggi between Canyon and Broadway, having no significant traffic impact. One of the most significant connections in the downtown area in the prior TSP was the extension of Hall to Jenkins. Cedar Hills north of Canyon would experience several segments above the 1.0 and 1.1 D/C ratio in 2020 and options for improvements in this area were evaluated. Different connection opportunities were tested both individually (Hall to Hocken, Hall to Jenkins, Dawson to Hocken, Fairfield to Hocken) and in groups. Key findings of the alternatives tested were:
 - Connecting Hall to Hocken without other parallel connections would overload the Hall section from Hocken to Cedar Hills and would create intersection capacity problems.
 - Connecting Hall to Jenkins and improving Jenkins to 5 lanes from Murray to Hall would attract significant volume, but would not allow traffic to disperse through several parallel roadways. This concentration would result in the need for several turn lane improvements.
 - Connecting Hall, Dawson, and Fairfield to Hocken would overload the Cedar Hills/Hall area. Combined, these connections/extensions would remove a significant volume of traffic from Farmington, TV Highway, and Murray. It would also create enough connectivity to carry significant volume though the downtown area without creating intersection capacity

problems.

- Connecting all streets in this sub-area (Hall to Jenkins, Hall to Hocken, Dawson to Hocken and Fairfield to Terman) would have significant benefit to surrounding arterials (reduce traffic on Murray by 4,000 to 6,000 vpd, TV Highway by 3,000 vpd, Walker by 2,000 vpd and Millikan by 2,000 vpd). Each of the connections when considered together would attract volumes that would be significant (Hall to Jenkins – 15,000 vpd, Hall to Hocken – 7,000 vpd, Dawson to Hocken and Fairfield to Terman – 4,000 to 6,000 vpd).

Based upon these findings, it is recommended that each of the connections be pursued in the future, progressively over time. Collectively the connections have significant mitigating effects on critical intersections that are over capacity in the future and cannot easily be mitigated by intersection widenings, grade separations or other new routes. The first connections might be the Hall extension to Hocken and the Dawson extension to Hocken since both require the least right-of-way or impacts. The Hall extension to Jenkins and the Fairfield extension to Terman should be planned in the next 20 years and implemented as performance standards in the area are exceeded. The value of the collective set of connections in this area are the far reaching benefits that they have as a group, reducing traffic at critical locations away from Cedar Hills Boulevard, such as TV Highway and Murray. Additionally, if all of the connections are made, the traffic volumes on Jenkins from Hall/Center to Cedar Hills and on Hall from Center to Cedar Hills would be reduced to a level that could allow for three travel lanes (allowing the potential to revise these streets to a boulevard style with the same paved width from curb to curb).

Lack of North-South Connectivity east of ORE 217. The issue of circulation on the east side of ORE 217 was raised at technical advisory and public meetings. This issue was studied to determine the benefits of improved connectivity in this area. Improvements were considered in three segments:

- **Walker to Western (C1).** A new road alignment was modeled that connected Walker Road at Canyon to Western Avenue at BH Highway. The new roadway would attract roughly 5,000 to 7,000 vpd but would not mitigate any capacity deficiencies in the surrounding area. Additionally, the net benefit to local/neighborhood through routes (connections between and including 91st to 107th) is a reduction of about 1,000 vpd (not more than 2,000 vehicles per day). Connections east of 91st and west of 107th would not experience significant volume reductions. The new connection would not divert traffic from areas with congestion problems. The arterial/collector intersections and links east of ORE 217 would not generally experience an improvement in performance and there were no deficiencies corrected by this new connector. Since the alignment would have significant

DKS Associates

property, wetland and business impacts would likely outweigh the benefits of the traffic reductions, the existing connectivity between Canyon and BH was determined to adequately serve future traffic demand. An alternative alignment of alternative C1 was considered that would utilize the 103rd Avenue existing alignments to reach from Western to Walker. This connection would serve the greatest benefit as a bike system connection, as well as providing additional connectivity for motor vehicle traffic. Based on input from the Traffic Commission, the 103rd extension alignment is the recommended improvement project for the C1 alternative and should be constructed as development occurs along the proposed alignment⁴. The Traffic Commission agreed that this connection would be an important bicycle connection and that additional north/south motor vehicle connectivity would be a valuable result.

- **Allen to Denney (C2).** A new road alignment was modeled that connected Allen to Denney just east of ORE 217. The new roadway did not prove to carry/attract volumes above 5,000 vehicles per day or divert significant volumes from congested roadways. In addition, the placement of new intersections for this connection would be in the vicinity of interchanges on ORE 217 and not meet ODOT's prescribed access spacing standards (1,320 feet). Based upon these findings, this option was not pursued in the TSP.
- **Nimbus from Hall to Denney (C3).** A new road alignment was modeled that extended Nimbus from Hall north to Denney. This connection was included in the 2015 Beaverton TSP, but was not adopted in the RTP Priority System. The Nimbus extension shows the ability to attract/carry over 5,000 vehicles per day (approximately 7,000). In addition, it would divert traffic from Hall Boulevard near Cascade, Greenway, and the proposed 125th connection, which all experience capacity deficiencies in the PM peak and would reduce the potential for cut-through traffic in the Vose neighborhood. Therefore, this new road alignment was determined to have significant benefits to the transportation system and retained in the TSP. Wetland issues and alignment issues through private property will need to be addressed in further consideration of this alternative.

Intersection Capacity. One of the lower cost means of improving motor vehicle performance is increasing capacity at intersections through addition of turn lanes and signal phasing modifications. These improvements can many times be made in advance of a major street improvement to increase capacity until more expensive street modifications can be made (for example the intersection improvements at Murray/Jenkins preceded the Murray overcrossing widening by several years). There are few alternatives to these improvements that do not have greater impacts or are not as effective at mitigating capacity deficiencies. While intersection

⁴ Based on Beaverton Traffic Commission special meeting, May 17, 2001.

DKS Associates

improvements can be lower cost improvements that improve motor vehicle capacity, they can add to the width of intersections which impacts pedestrian crossing by increasing exposure and lengthening crossing times. A series of 35 intersection improvements were identified which primarily add turning movement capacity.

Other issues. Beyond these capacity and circulation issues noted above, public input provided direction to investigate several other issues as options to roadways already identified in the RTP or TSP for future improvements. Alternatives were analyzed at the following locations:

- **Bethany Boulevard (E).** The RTP identifies Bethany Boulevard to be improved to 5 lanes from Bronson to West Union Road. Analysis was done to determine the benefits of extending the 5-lane section south to the US 26 westbound ramp as well as all the way to Cornell (including a widening of the US 26 overcrossing). The results showed that the full improvement (5 lanes from Cornell to Bronson) would be needed to satisfy traffic volume demand. Capacity deficiencies on Bethany could not be mitigated without the extension of the 5-lane section of Bethany south to Cornell in 2020.
- **Scholls Ferry Road (F1-F2).** The RTP identifies Scholls Ferry Road to be improved with system management from ORE 217 to 125th. Alternative improvements were analyzed that included increasing the section to 7 lanes and constructing Scholls Ferry overcrossing of Cascade to Nimbus. Results indicated that these alternatives would not be necessary to further improve the transportation system in 2020 due to additional connections in the Washington Square area (proposed in the priority RTP). The proposed street performance standards could be met (marginally) in 2020 without widening to seven lanes. However, the corridor is on the fringe of acceptable operating performance and for future planning the Scholls Ferry corridor from Hall to Murray should be anticipated that at some time further widening to seven lanes will be necessary. Therefore, reservation of right of way to seven lanes should be considered, consistent with the 1988 Washington County Transportation Plan, prior TSP and preferred RTP. In particular, when the ORE 217 corridor study is conducted, the reconstruction of the Scholls Ferry Road overcrossing of ORE 217 should consider the potential to extend the grade separation beyond the railroad tracks southwest of ORE 217 to provide for access spacing consistent with standards in the Oregon Highway Plan (1,320 feet to the first signal at Nimbus).
- **170th/173rd (H).** The existing traffic count on 173rd to the south of Walker indicates that the daily traffic volume on 173rd is approximately 9,000 vehicles per day (vpd). Currently, 170th is a dead-end north of Baseline. The existing through movement between Baseline and Walker must travel on 173rd today. The existing peak hour level of service (LOS) at 173rd/Walker is LOS E, with a volume to capacity (V/C) ratio of 0.98. The existing peak hour operation at 170th/Baseline is LOS C with a V/C of 0.58.

Forecasted base 2020 volumes (RTP Priority Scenario without the 170th/173rd improvement project where 173rd is the only north-south route and 170th is a dead-end) indicate that approximately 13,000 vpd would use 173rd between Walker and Baseline. The corresponding LOS at 173rd/Walker is LOS D with a demand to capacity ratio (D/C) of 1.01 (due to Walker becoming 5 lanes in the priority scenario). The operation at 170th/Baseline would be LOS F with a D/C ratio of 1.06 due to heavy turning traffic to get to 173rd. Previous transportation plans in the area have identified the need for a corridor improvement to handle this traffic growth. Plans including the 1988 Washington County Transportation System Plan (TSP), the 2015 Beaverton TSP, and the 2000 Metro Regional Transportation Plan (RTP) have all identified a new road alignment that extends 170th north of Baseline to create a through route linking to 173rd south of Walker Road. As part of the MSTIP program, voters approved the funding for the 170th/173rd project as part of a larger list of specific projects. Additional options proposed at public forums for this 2020 Beaverton TSP update have been analyzed and information is summarized below.

TSP/RTP/MSTIP Project. This option would extend 170th north of Baseline as a 3 lane roadway and would curve to the west near Walker to connect to the existing 173rd/Walker intersection. The alignment of 173rd would be changed to intersect the new through roadway to the south of Walker. Land development along the planned 170th alignment has been coordinated with the improvement project, including preservation of right of way and restriction of residential fronting access. Intersection improvements associated with the planned projects and redirection of turning movements to through movements would improve the intersection operation at 173rd/Walker to LOS D with a D/C of 0.97 and improve 170th/Baseline to LOS D with a D/C of 0.91 (2020 PM peak hour). This through route would also provide the capacity to relieve congestion from corridors including 158th and 185th by keeping sub-area traffic in 170th/173rd rather than impacting other arterial corridors with out of direction travel. The forecasted volume on the proposed through roadway to the south of Walker and to the north of the 173rd connection is approximately 18,000 vpd (approximately 11,000 vpd near Baseline). The remaining piece of 173rd north of Baseline would become a neighborhood route with lower volume.

170th/173rd couplet and 173rd extension. An alternative improvement option was proposed at the public forum that includes maintaining 173rd as a 2 lane road, extending 173rd south over the LRT line and connecting it at 170th/Merlo, and extending 170th directly north to Walker as a 2 lane road parallel to 173rd. The goal of this alternative was to spread the through traffic between the two roadways (170th and 173rd). Traffic forecasts indicate that the traffic would spread between the two roadways as expected, with forecasted volumes on 173rd at 9,000 vpd and on 170th

DKS Associates

at 4,000 vpd. However, there were several impacts to the transportation system resulting from this alternative. First, creating a couplet road system from Baseline to Walker removes the single through route on the 170th/173rd corridor, which would force traffic to use Baseline, Walker, and the neighborhoods streets that connect the two (resulting in neighborhood impacts of 2,000 to 5,000 vpd). Second, the increase of turn volumes at the intersection of 173rd/Walker and 170th/Baseline would decrease their operation to a LOS of E with a D/C of 1.04 and a LOS of D with a D/C of 0.94, respectively. Third, the queue lengths on Baseline and 173rd were analyzed to determine storage capacity, as traffic would potentially back up towards the intersection of 173rd/Baseline from the LRT gated crossings. It was determined that with the forecasted 2020 volumes, queue lengths could exceed the available storage and potentially cross at the intersection of 173rd/Baseline, creating potential for a traffic gridlock condition. Fourth, the new rail crossing would need significant study, as required by ODOT, that proves it would be of significant benefit to the transportation system (as explained above, it would not). Finally, removing the through route on the 170th/173rd corridor would force traffic onto nearby congested corridors. This would decrease intersection operation to a D/C of larger than one at the study intersections including 158th/Walker, 158th/Cornell, 158th/Jenkins, Cornell/173rd, 158th/Blueridge, 158th/Jay, and 170th/TV Highway. Based upon these findings this option was rejected.

TSP/MSTIP/RTP project alternative alignment. An alternative alignment of the 170th extension from Baseline to Walker was proposed at a public forum. The proposed alignment would curve 170th to the west closer to Baseline (just south of Elmonica School). The goal of this alignment change would be to re-route through traffic away from Elmonica School changing the crossover point between 173rd and 170th further south. Operationally speaking, this alignment change results in similar intersection operations as the original 170th/173rd alignment since the 173rd/Walker and 170th/Baseline intersections are unchanged. The only issues that would arise are the right of way impacts along the new road alignment both in terms of the fronting properties and the impact of the reversing curves to make the 170th/173rd transition. The curve transition from 170th to 173rd, although it was originally proposed to pass through undeveloped land, would impact potentially 6 to 12 homes with this option as the curve reverses just south of Elmonica Elementary School. Additionally, 173rd from Walker to the curve would have right of way impacts to widen to 3 lanes. There are also a few residential units that would have fronting access onto the new through route on 173rd with the proposed alignment alternative (generally there are none on the original alignment).

Based on the above finding, the planned 2015 TSP/MSTIP/RTP project is continued to be recommended for this 2020 Beaverton TSP update. Additionally, it is recommended that the alternative curve alignment and Elmonica School circulation

and access issues be reviewed in the project design process⁵.

- **ORE 217 frontage road (K).** The 2015 TSP included a frontage roadway linking Walker to Canyon Road and Cabot/Center Street, combined with braiding of ORE 217 freeway ramps. An option would be simply to braid the Walker/Canyon freeway ramps to ORE 217. Based upon testing both options, in 2020 the benefits of the frontage road connection on adjacent streets were not as significant as the benefits of extra connectivity on the Hall/Jenkins/Cedar Hills area. The frontage road would reduce the volumes on Walker by less than 500 vpd and would decrease volumes on Canyon by less than 2,000 vpd. The extra connectivity on the Hall/Jenkins/Cedar Hills area, as described previously, would reduce traffic volume in the range of 2,000 to 4,000 vpd on several congested arterials, including TV Highway and Walker. Therefore, the TSP should include the braiding of ramps as part of the ORE 217 improvements between Canyon and Walker, but the frontage road improvements would not need to be part of the TSP (see appendix N for a photo-simulation of the interchange from the 2015 TSP, which included the frontage road).
- **Murray/Davies Extensions (L1-L2).** This area was analyzed to determine the impact of the planned improvements on the local street network of extending Murray Boulevard to Walnut at Barrows and extending Davies Road south to Barrows disconnecting Barrows at Scholls Ferry Road. Tests were run extending both Murray and Davies, extending each individually and looking at turn restrictions at Davies/Barrows/Scholls Ferry. The need for the Davies/Barrows realignment is two fold: 1) the existing spacing between 135th and Barrows on Scholls does not meet access spacing standards; 2) the short spacing has resulted in a significant number of collisions that can be mitigated by realigning Barrows with Davies. The realignment of Barrows with Davies would not significantly increase traffic on Davies as long as the extension of Murray to Walnut is in place. The majority of Barrows traffic is destined for Scholls Ferry Road and would not be benefited by using Davies based upon results from travel forecast testing. Building the Murray extension after the Davies extension shows that additional though traffic would be diverted onto Davies north of Scholls Ferry. Turn restrictions were modeled at Davies/Scholls Ferry that eliminated northbound cut-through traffic on Davies after the Murray extension was built and Scholls Ferry/Barrows was closed. These turn restrictions indicate that traffic from Davies would be diverted to adjoining neighboring local streets (Weir/Haystack/130th all would experience a significant increase in traffic compared to existing volume – about 1,000 vpd). Therefore, the extension of Murray Boulevard to Walnut should be complete before the Davies extension to Barrows is complete and the intersection of Davies/Scholls Ferry

⁵ City of Beaverton Traffic Commission Meetings, May 17th and June 14th, 2001.

should be a non-turn-restricted intersection.

- **Murray/TV Hwy and Murray/Farmington (A1).** These intersections were further examined for possible improvements to handle the large north-south and east-west (as well as turning) volumes. In the prior TSP, the maximum numbers of turning lanes were assumed at these locations to achieve marginally acceptable operating performance. Improving each approach with turn lanes and signal controls would greatly improve the intersection operation and increase the intersection capacity, but it would not ultimately handle the projected 2020 volumes. Additionally, if TV Hwy were identified for improvement to an access-controlled facility by the corridor study, there would be a grade separation at Murray Boulevard. With the railroad crossing immediately to the south of TV Highway, a grade separation of Murray over TV Highway and the railroad tracks would be a future alternative for safety and operational performance. To solve both issues at once, raising Murray as four through lanes over TV Highway and Farmington would solve the intersection capacity problems at both intersections. Furthermore, the Murray overcrossing would eliminate the at-grade railroad crossing on Murray, which could benefit a potential future Commuter Rail extension to south Hillsboro. Turn volumes from TV Highway and Farmington to Murray would be handled by an interchange design to be identified in further review and design. Therefore, to mitigate the intersection capacities at these major intersections, turn lane improvements would be a 10-15 year solution (which would solve existing capacity problems) and the Murray overcrossing would be the ultimate 15-30 year improvement.

DKS Associates

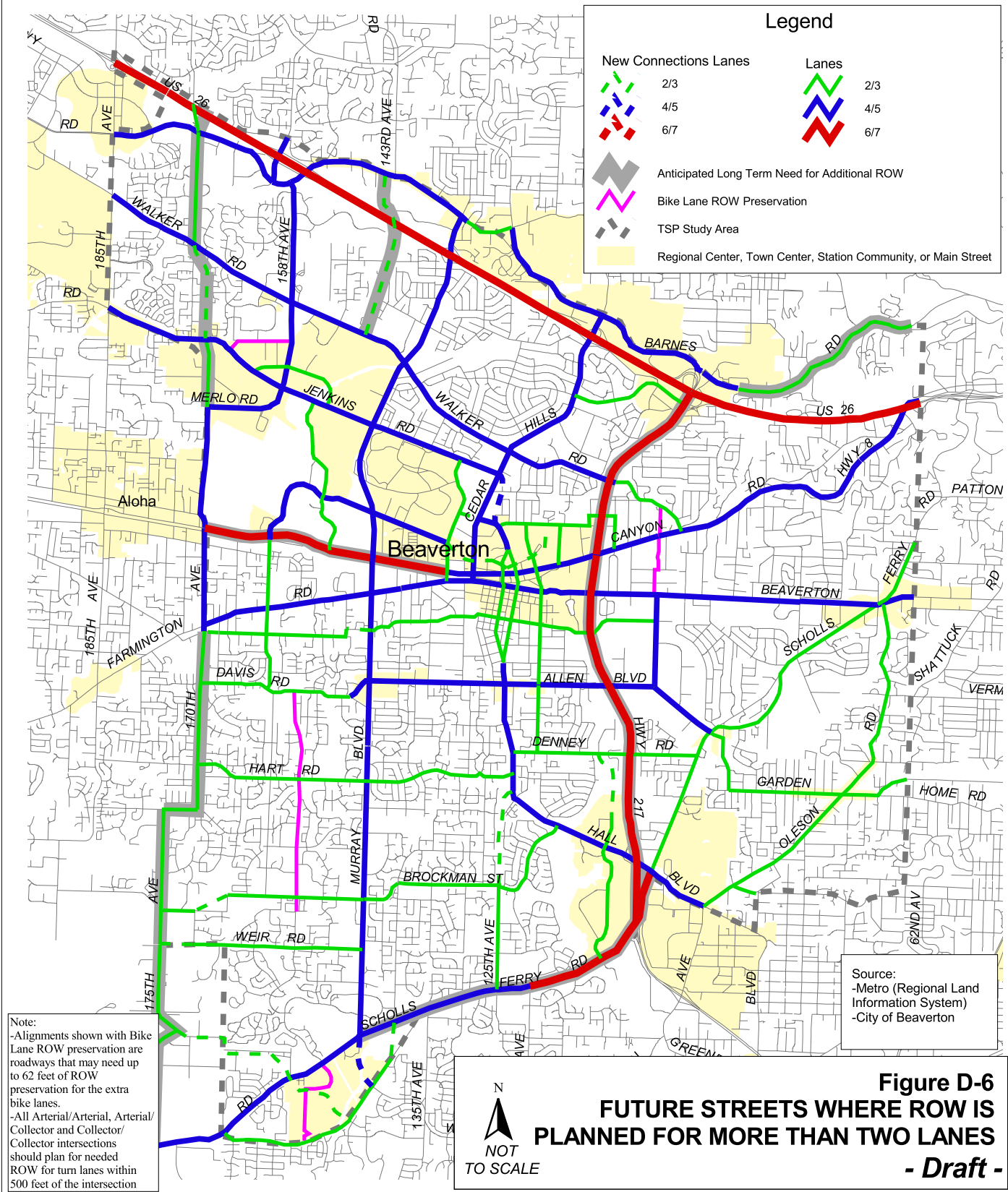
Table D-6

Beaverton 2020 TSP Preferred Additional Motor Vehicle Improvement Plan

Note: Location #'s listed as " b" indicate that the improvement is in addition to an intersection improvement at that location from the 2015 TSP, intersections that were not included in the 2015 TSP improvement plan are numbered starting with 101

Location #	Location	Description	Cost
	Bethany Boulevard: Cornell to Bronson	Widen street to 5 lanes including sidewalks and bike lanes (this includes the widening of the US 26 overcrossing and intersection improvements).	\$3,424,000
	Cornell: 143 rd to Dale	Widen street to 5 lanes including sidewalks and bike lanes.	\$5,197,500
	Cornell: Dale to Saltzman	Future capacity improvement based on additional study and coordination with Washington County	\$8,620,000
	Walker: Cedar Hills to ORE 217	Widen street to 5 lanes including sidewalks and bike lane.	\$8,970,000
	Murray: TV Hwy to Farmington	Construct an 4 lane overpass (Murray over TV Highway and Farmington), including sidewalks, bike lanes, and interchange connections	\$28,517,500
	103 rd : Western to Walker	Improve existing roadway and construct new connections and intersection alignments to provide connectivity from Walker to Western. This project includes sidewalks and bike lanes and should be built as development occurs.	\$5,500,000
	120 th Avenue: Henry to Canyon Road	Construct a 2 lane collector road, including sidewalks and bike lanes	\$3,900,000
	Fairfield: Cedar Hills to Hocken	Construct a 2 lane roadway, including sidewalks and bike lanes	\$5,500,000
	Rose Biggi: Canyon to Broadway	Construct a 2 lane collector road, including sidewalks and bike lanes	\$1,200,000
101	Bethany/US 26 WB	add 2nd WB RT Lane, NB LT Lane	N/A
102	Bethany/Cornell	overlap SB RT	N/A
103	Cornell/173 rd	add WB RT lane, 2nd NB LT lane, NB RT lane, SB RT lane	\$2,200,000
6b	170th/Farmington	add EB RT lane, WB RT lane (signal modification)	\$750,000
11b	158th/Jenkins	overlap NB RT	\$125,000
104	Cornell/US 26 WB	add 2nd WB LT lane (structure work)	\$1,000,000
105	Murray/Cornell	overlap NB RT, add 2nd NB LT lane (Cornell 5 lanes)	\$1,000,000
106	Murray/US 26 WB	add 2nd WB RT Lane	\$500,000
17b	Murray/Walker	increase cycle length by 20 seconds (to 120)	\$125,000
19b	Murray/TV Highway	2 new signals, 2 RT Lanes, 2 Double LT Lanes	N/A
20b	Murray/Farmington	2 new signals, 2 RT Lanes, 2 Double LT Lanes	N/A
22b	Murray/Allen	add 2nd WB LT lane, 2nd WB RT lane, overlap WB RT lane (signal modification)	\$1,250,000
107	Cedar Hills/Barnes	add 2nd NB lane and SB LT lane	\$1,000,000
108	Cornell/Saltzman	add 2nd NB lane and SB LT lane (Cornell to 5 lanes)	\$2,000,000
109	Canyon/Lombard	add EB RT lane	\$500,000
65b	Denney/ORE 217 SB	add EB RT lane (structure work)	\$1,100,000
110	BH Highway/Laurelwood	add SB LT lane (signal modification and ROW)	\$2,000,000
111	Scholls Ferry/Laurelwood	install traffic signal, align with Nicol, ROW, 2 LT lane modifications	\$1,750,000
112	Hall/ORE 217 SB/Cascade	add SB RT lane	\$250,000
43b	Hall/Greenway	add EB RT lane	\$500,000
42b	Hall/Denney	add 2nd WB LT lane	\$500,000
36b	Farmington/Cedar Hills	add 2nd EB LT lane, ROW	\$1,250,000
32b	Cedar Hills/Jenkins	Jenkins to 5 lanes, overlap WB RT	\$125,000
31b	Cedar Hills/Walker	add 40 seconds cycle length to 140	\$125,000
113	Murray/Brockman	add WB RT lane, SB RT lane, add 20 seconds cycle to 120 seconds, ROW	\$100,000
47b	Scholls Ferry/125th	overlap SB RT	\$125,000
50b	Scholls Ferry/ORE 217 NB on ramp	add 2nd NB LT lane and a 2nd WB LT lane	\$1,000,000
		TOTAL	\$90,104,000

City of Beaverton Transportation System Plan



DKS Associates

Results

The result of these improvements is significant. While a D/C ratio of nearly 1.0 and LOS E still exist for the most part, the 2020 traffic conditions can be mitigated to the point that mobility can be preserved in Beaverton and congestion is manageable. Table D-7 lists the intersection operation for the base 2020 and the TSP mitigated 2020 scenarios. Figure D-7 shows the forecasted 2020 PM peak hour volumes in Beaverton for the TSP mitigated scenario.

Table D-7
PM Peak Hour Intersection Level of Service
Study Intersections Along Scholls Ferry Road

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand/ Capacity
Murray/Scholls Ferry	D	54.2	0.97	D	49.2	0.93
Scholls Ferry/121 st	D	37.3	0.93	D	37.0	0.92
Scholls Ferry/125 th	E	63.3	1.05	D	51.4	0.98
Scholls Ferry/135 th	B	13.4	0.66	B	13.0	0.64
Scholls Ferry/Allen	D	50.2	0.95	D	52.3	0.96
Scholls Ferry/Barrows	Road Closure			Road Closure		
Scholls Ferry/Cascade	C	32.9	0.93	C	32.7	0.93
Scholls Ferry/Conestoga	B	12.7	0.78	B	12.5	0.77
Scholls Ferry/Davies	B	18.2	0.70	B	18.1	0.70
Scholls Ferry/Denney	C	24.7	0.77	C	24.6	0.77
Scholls Ferry/Hall	D	40.9	0.75	D	38.8	0.77
Scholls Ferry/Nimbus	E	65.4	1.07	D	41.8	0.92
Scholls Ferry/Laurelwood	B/F			A	9.0	0.62
Scholls Ferry/ORE 217 northbound off ramp	B	19.6	0.64	C	20.1	0.68
Scholls Ferry/ORE 217 northbound on ramp	F	>100.0	1.43	D	42.7	0.96
Scholls Ferry/ORE 217 southbound ramp	C	32.3	0.74	C	34.0	0.78

Study Intersections Along TV Highway/Canyon Road

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
170 th /TV Hwy	F	89.3	1.15	D	47.7	0.96
160 th /TV Hwy	E	73.8	1.14	C	34.8	0.90
Canyon/117 th	C	25.9	0.76	C	24.5	0.74
Canyon/87 th	C	25.0	0.85	C	25.1	0.85
Canyon/Cedar Hills	D	37.9	0.95	D	54.5	0.99

DKS Associates

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
Canyon/Hall	C	25.3	0.84	C	26.7	0.85
Canyon/Watson	C	22.7	0.84	C	30.4	0.91
Canyon/Lombard	D	44.7	0.95	D	44.1	0.94
Canyon/Hocken	D	49.5	1.03	C	34.2	0.84
Canyon/ORE 217 northbound ramp	C	28.5	0.81	C	26.2	0.74
Canyon/ORE 217 southbound ramp	C	28.4	0.84	C	25.6	0.77
TV Hwy/Murray	F	>100.0	1.10	C	22.2	0.71

Study Intersections Along Farmington Road/Beaverton-Hillsdale Highway

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
170 th /Farmington	F	88.3	1.14	D	54.1	0.98
BH Hwy/Griffith	C	30.8	0.76	C	30.5	0.74
BH Hwy/Laurelwood	E	66.7	1.09	C	34.4	0.94
BH Hwy/Western	C	29.4	0.72	D	43.9	0.93
Farmington/Cedar Hills	D	53.2	1.08	C	21.1	0.72
Farmington/Hall	C	28.7	0.90	C	30.4	0.92
Farmington/Hocken	C	22.4	0.74	C	31.4	0.88
Farmington/Lombard	D	51.6	0.97	D	50.9	0.97
Farmington/ORE 217 northbound ramp	C	28.4	0.80	C	27.4	0.78
Farmington/ORE 217 southbound ramp	C	33.5	0.89	C	29.9	0.85
Farmington/Watson	C	23.4	0.85	C	27.6	0.88
Murray/Farmington	F	>100.0	1.16	C	30.1	0.77

Remaining Study Intersections

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
158 th /Blueridge	D	40.7	0.99	D	38.8	0.98
158 th /Cornell	D	39.2	0.97	D	41.5	0.98
158 th /Jay	C	32.9	0.92	D	44.1	0.99
158 th /Jenkins	E	78.6	1.10	D	46.5	0.94
158 th /Walker	E	58.9	1.01	D	52.4	0.98
170 th /Baseline	D	43.5	0.95	D	53.3	0.99
170 th /Oak	B	12.6	0.75	B	13.3	0.78
170 th /Merlo	C	27.8	0.72	C	27.8	0.72

DKS Associates

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
170 th /Hart/Bany	C	33.6	0.71	C	34.8	0.75
173 rd /Walker	D	36.0	0.86	D	36.1	0.87
Allen/ORE 217 northbound ramp	C	32.4	0.90	D	37.2	0.95
Allen/ORE 217 southbound ramp	C	35.0	0.90	D	37.1	0.93
Allen/Western	D	37.2	0.92	D	47.2	0.98
Cedar Hills/Barnes	F	>100.0	1.22	E	59.2	0.96
Cedar Hills/Butner	D	40.2	0.95	D	41.7	0.97
Cedar Hills/Hall	D	35.5	0.90	D	42.6	0.90
Cedar Hills/Jenkins	D	41.8	0.92	D	48.6	0.92
Cedar Hills/US 26 eastbound ramps	C	29.5	0.90	C	24.9	0.85
Cedar Hills/US 26 westbound ramps	C	29.9	0.97	C	25.1	0.93
Cedar Hills/Walker	F	>100.0	1.34	E	53.9	0.98
Cornell/143rd	E	55.3	0.90	E	56.2	0.74
Cornell/173 rd	F	>100.0	1.24	E	56.5	0.98
Cornell/Barnes/Saltzman	F	>100.0	1.42	E	63.3	0.97
Cornell/Bethany	E	54.3	1.02	D	38.6	0.91
Denney/ORE 217 northbound ramp	D	37.0	0.85	D	42.1	0.88
Denney/ORE 217 southbound ramp	D	42.7	0.96	D	40.1	0.94
Garden Home/84 th	A/D			A/D		
Garden Home/88 th	A/C			A/C		
Greenway/125 th	D	36.5	0.77	D	38.9	0.81
Hall/Allen	D	48.6	0.97	D	46.3	0.95
Hall/Cascade/ORE 217 southbound ramp	E	76.0	1.11	D	41.0	0.88
Hall/Center	C	25.7	0.68	C	25.4	0.72
Hall/Denney	E	57.9	1.02	C	26.9	0.88
Hall/Greenway	D	49.9	1.01	D	35.6	0.97
Hall/Nimbus	D	43.9	0.95	C	31.5	0.83
Hart/155 th	B	15.8	0.52	B	15.9	0.52
Murray/6 th	C	34.2	0.98	C	28.8	0.90
Murray/Allen	F	>100.0	1.27	D	44.7	0.88
Murray/Brockman/Beard	F	98.7	1.19	D	48.6	0.95
Murray/Cornell	F	>100.0	1.39	E	56.3	0.98
Murray/Hart	D	52.6	1.01	D	40.4	0.98
Murray/Jenkins	E	75.4	1.15	D	38.8	0.89

DKS Associates

Intersection	Base 2020			Mitigated 2020		
	Level of Service	Average Delay	Demand/ Capacity	Level of Service	Average Delay	Demand / Capacity
Murray/US 26 eastbound ramps	B	14.6	0.68	B	16.5	0.64
Murray/US 26 westbound ramps	E	65.1	1.10	C	30.3	0.87
Murray/Walker	E	60.9	1.06	D	49.4	0.96
Oleson/Garden Home	D	49.7	1.00	D	49.6	1.00
Oleson/Vermont	C	25.4	0.78	C	25.4	0.78
US 26 eastbound ramp/Bethany	D	53.8	1.01	C	31.9	0.86
US 26 eastbound ramp/Cornell	C	23.5	0.86	C	25.7	0.90
US 26 westbound ramp/Bethany	F	85.9	1.19	D	37.3	0.95
US 26 westbound ramp/Cornell	D	53.2	1.01	D	37.3	0.91
Walker/ORE 217 northbound ramp	C	24.1	0.76	C	27.4	0.83
Walker/ORE 217 southbound ramp	B	15.9	0.64	B	18.6	0.80

**City of Beaverton
Transportation System Plan**



LEGEND

- 1000** - PM Peak Hour Volume (two-way)
- - Study Area Boundary Line

